

[MS-CSDLBI]: Conceptual Schema Definition File Format with Business Intelligence Annotations

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Revision Summary

Date	Revision History	Revision Class	Comments
07/16/2012	1.0	New	Released new document.
10/08/2012	2.0	Major	Significantly changed the technical content.
10/23/2012	2.1	Minor	Clarified the meaning of the technical content.
03/26/2013	2.2	Minor	Clarified the meaning of the technical content.
06/11/2013	2.2	No change	No changes to the meaning, language, or formatting of the technical content.

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1 Introduction

Conceptual schema definition language with business intelligence annotations (CSDLBI) is an XML-based file format that is used to annotate **Entity Data Model (EDM)**-based conceptual models to provide specific information that is useful in business intelligence (BI) applications. **Conceptual schema definition language (CSDL)** is a language that is based on XML and that can be used for defining EDM-based conceptual models.

Sections 1.7 and 2 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in RFC 2119. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are defined in [\[MS-OFCGLOS\]](#):

- complex type**
- hierarchy**
- simple type**
- XML namespace**
- XML schema**

The following terms are defined in [\[MC-CSDL\]](#):

- annotation**
- association**
- collection**
- conceptual schema definition language (CSDL)**
- entity**
- Entity Data Model (EDM)**
- identifier**
- namespace**
- property**
- schema**

The following terms are defined in [\[MS-SSAS\]](#):

- dimension**
- level**
- measure**

The following terms are specific to this document:

conceptual schema definition language with business intelligence annotations (CSDLBI): A language that is based on XML and that can be used to annotate **EDM**-based conceptual models with specific information that is useful in business intelligence applications.

conceptual schema definition language with business intelligence annotations (CSDLBI) document: A document that contains a conceptual model that is defined by using the **CSDL** and **CSDLBI** code.

CSDLBI 1.0: A version of **CSDLBI** that has a slightly reduced set of capabilities, which are identified in this document. CSDLBI 1.0 documents reference the following **XML namespace**:

<http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions>

CSDLBI 1.1: The version of **CSDLBI** that is defined immediately following **CSDLBI 1.0**. CSDLBI 1.1 documents reference the following **XML namespace**:

<http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions>

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [\[RFC2119\]](#). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[MC-CSDL] Microsoft Corporation, "[Conceptual Schema Definition File Format](#)".

[MS-SSAS] Microsoft Corporation, "[SQL Server Analysis Services Protocol](#)".

[MSDN-NLS] Microsoft Corporation, "National Language Support (NLS) API Reference", <http://msdn.microsoft.com/en-us/goglobal/bb896001.aspx>

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.ietf.org/rfc/rfc2119.txt>

[XML1.0] Bray, T., Paoli, J., Sperberg-McQueen, C.M., and Maler, E., "Extensible Markup Language (XML) 1.0 (Second Edition)", W3C Recommendation, October 2000, <http://www.w3.org/TR/2000/REC-xml-20001006>

[XMLNS] Bray, T., Hollander, D., Layman, A., et al., Eds., "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation, December 2009, <http://www.w3.org/TR/2009/REC-xml-names-20091208/>

[XMLSCHEMA1] Thompson, H.S., Ed., Beech, D., Ed., Maloney, M., Ed., and Mendelsohn, N., Ed., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>

1.2.2 Informative References

[MS-OFCGLOS] Microsoft Corporation, "[Microsoft Office Master Glossary](#)".

1.3 Overview

Conceptual schema definition language with business intelligence annotations (CSDLBI) is an XML-based file format that is used to annotate Entity Data Model (EDM)-based conceptual models and is based on standards that are defined in [\[XML1.0\]](#) and [\[XMLSCHEMA1\]](#). Type names in CSDLBI are generally the same as in conceptual schema definition language (CSDL). For more details about CSDL, see [\[MC-CSDL\]](#).

Conceptually, a **CSDLBI document** has an overall structure that resembles the following.

```
<Schema>
  <Using/>
```

```

<Using/>

<ComplexType/>

<Function/>
<Function/>

<EntityContainer>
  <EntitySet>
    <bi:EntitySet/>
  <EntitySet/>

  <EntitySet>
    <bi:EntitySet/>
  <EntitySet/>

  <AssociationSet>
    <End/>
    <End/>
    <bi:AssociationSet/>
  </AssociationSet>

  <AssociationSet>
    <End/>
    <End/>
    <bi:AssociationSet/>
  </AssociationSet>

  <bi:EntityContainer>
    <bi:CompareOptions/>
  </bi:EntityContainer>
</EntityContainer>

<EntityType>
  <Key>
    <PropertyRef/>
  </Key>

  <Property>
    <bi:Property>
  </Property>

  <Property>
    <bi:Property>
  </Property>

  <Property>
    <bi:Measure>
      <bi:Kpi>
        <bi:Goal>
          <bi:PropertyRef/>
        </bi:Goal>
        <bi:Status>
          <bi:PropertyRef/>
        </bi:Status>
      </bi:Kpi>
    </bi:Measure>
  </Property>

```

```

<NavigationProperty>
  <bi:NavigationProperty/>
</NavigationProperty>

<bi:EntityType>
  <bi:Hierarchy>
    <bi:Level>
      <bi:Source>
        <bi:PropertyRef/>
      </bi:Source>
    </bi:Level>
    <bi:Level>
      <bi:Source>
        <bi:PropertyRef/>
      </bi:Source>
    </bi:Level>
  </bi:Hierarchy>
</bi:EntityType>
</EntityType>

<EntityType>
  <bi:EntityType>
    <bi:Hierarchy>
      <bi:Level>
        <bi:Source>
          <bi:PropertyRef/>
        </bi:Source>
      </bi:Level>
      <bi:Level>
        <bi:Source>
          <bi:PropertyRef/>
        </bi:Source>
      </bi:Level>
    </bi:Hierarchy>
  </bi:EntityType>
</EntityType>

<Association>
  <End/>
  <End/>
</Association>

<Association>
  <End/>
  <End/>
</Association>
</Schema>

```

Note The previous example is not a detailed specification. It is meant to provide only a visual overview.

1.4 Relationship to Protocols and Other Structures

The CSDLBI format uses CSDL [\[MC-CSDL\]](#) to provide the structure and semantics.

The CSDLBI format is used to specify SQL Server Analysis Services database metadata, as described in [\[MS-SSAS\]](#).

There are no **schemas**, protocols, or other structures that extend CSDLBI.

1.5 Applicability Statement

CSDLBI is a file format for defining **annotations** to CSDL models that support business intelligence (BI) applications.

1.6 Versioning and Localization

This document describes the following CSDLBI versions for Microsoft SQL Server 2012 Service Pack 1 (SP1):

- **CSDLBI 1.0**
- **CSDLBI 1.1**

Aspects of CSDLBI 1.1 that do not apply to CSDLBI 1.0 are identified in the text.

1.7 Vendor-Extensible Fields

None.

2 Structures

Conceptual schema definition language (CSDL) supports application-specific customization and extension through the use of annotations. These annotations enable applications to embed application-specific and vendor-specific information into CSDL. The CSDL format does not specify how to process these custom-defined structures or how to distinguish structures from multiple vendors or layers. Parsers of CSDL can ignore annotations that are not expected or are not understood.

Annotations can be of two kinds:

- **AnnotationElement**, as defined in [\[MC-CSDL\]](#) section 2.1.22.
- **AnnotationAttribute**, as defined in [\[MC-CSDL\]](#) section 2.2.7.

Conceptual schema definition language with business intelligence annotations (CSDLBI) is defined by **complex types**, some of which include **simple types** and other complex types.

The following CSDL elements are annotated by the corresponding CSDLBI complex types, as shown in the table.

CSDL element	CSDLBI complex type
EntityContainer	TEntityContainer
EntitySet	TEntitySet
AssociationSet	TAssociationSet
EntityType	TEntityType
Property	TProperty
NavigationProperty	TNavigationProperty

Other complex types that are defined in the CSDLBI schema are included in the definitions of the complex types that are listed in the preceding table. These complex types are as follows:

- [TCompareOptions](#)
- [TBaseProperty](#)
- [TPropertyRefs](#)
- [TPropertyRef](#)
- [TMember](#)
- [TKpi](#) (introduced in CSDLBI 1.1)
- [TMemberRefs](#)
- [TMemberRef](#)
- [THierarchy](#) (introduced in CSDLBI 1.1)
- [TLevel](#) (introduced in CSDLBI 1.1)

- [TDocumentation](#)

One more complex type that is defined in the CSDLBI schema is [TMeasure](#). The **TMeasure** complex type is used to define the **Measure** element. The **Measure** element is introduced in the CSDLBI 1.0 schema.

Some complex types include simple types. The simple types that are defined in the CSDLBI schema are as follows:

- [TState](#)
- [TDirectQueryMode](#)
- [TContents](#)
- [TDefaultAggregateFunction](#)
- [TGroupingBehavior](#)
- [TStability](#)
- [TAlignment](#)
- [TSortDirection](#)
- [TContextualNameRule](#)
- [TEntityContents](#)

The CSDLBI schema defines a total of 18 complex types and 10 simple types. Section [2.1](#) contains a subsection for each complex type. The simple types that are included in complex types are defined in subsections under the complex type to which they belong.

An example of a CSDL model that is annotated by using these types is provided in Section [3](#) of this specification.

2.1 Complex and Simple Types

This section specifies each complex type that is defined by conceptual schema definition language with business intelligence annotations (CSDLBI). Each simple type that is part of a complex type is defined in a subsection under the complex type to which it belongs.

The prefix `bi:` refers to the following **XML namespace**:
<http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions>.

For more information about namespaces, see [\[XMLNS\]](#).

2.1.1 TEntityContainer

The **TEntityContainer** complex type annotates the **EntityContainer** element that is defined in [\[MC-CSDL\]](#) section 2.1.14. The **EntityContainer** element is conceptually similar to a database or data source. It groups **EntitySet** and **AssociationSet** child elements that represent a data source.

The **TEntityContainer** complex type is defined in the schema as follows.

```
<xs:complexType name="TEntityContainer">
  <xs:sequence>
```

```

    <xs:element name="CompareOptions" type="bi:TCompareOptions" />
  </xs:sequence>
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="Culture" type="xs:string" />
  <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
</xs:complexType>

```

The elements and attributes that are defined by the **TEntityContainer** complex type are specified in the following tables.

Element	Description
CompareOptions	Contains language-specific sorting and string comparison options for the model. The contents of this element are defined by the TCompareOptions complex type (section 2.1.2).

Attribute	Description
Caption	Describes the database or data model.
Culture	Contains the culture name from the National Language Support (NLS) API reference [MSDN-NLS] .
DirectQueryMode	Determines which mode is used for a query. The contents of this attribute are defined by the TDirectQueryMode simple type (section 2.1.1.1).

2.1.1.1 TDirectQueryMode

The **TDirectQueryMode** simple type is an enumeration that indicates the kind of query that will be conducted in DirectQuery mode. Data stores can opt to cache database information. In that case, the client can query the cache or the backing store, depending on user instructions.

The **TDirectQueryMode** simple type is defined in the schema as follows.

```

<xs:simpleType name="TDirectQueryMode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="InMemory" />
    <xs:enumeration value="InMemoryWithDirectQuery" />
    <xs:enumeration value="DirectQueryWithInMemory" />
    <xs:enumeration value="DirectQuery" />
  </xs:restriction>
</xs:simpleType>

```

The possible values for the **TDirectQueryMode** simple type are specified in the following table.

Value	Meaning
InMemory	Indicates that queries against the model will be conducted against the cache.
InMemoryWithDirectQuery	Indicates that queries against the model are conducted against the cache by default.

Value	Meaning
DirectQueryWithInMemory	Indicates that queries against the model primarily reference the relational data source but can use the cache, if the cache is available.
DirectQuery	Indicates that queries against the model reference only the relational data source.

2.1.2 TCompareOptions

The **TCompareOptions** complex type defines collation **properties** that are applied to the data model. The values for **CompareOptions** are based on the **Database.Collation** element, as defined in [\[MS-SSAS\]](#) section 2.2.4.2.2.5.

The **TCompareOptions** complex type is defined in the schema as follows.

```
<xs:complexType name="TCompareOptions" >
  <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
</xs:complexType>
```

The attributes that are defined by the **TCompareOptions** complex type are specified in the following table.

Attribute	Description
IgnoreCase	Indicates whether the string comparison SHOULD ignore case.
IgnoreNonSpace	Indicates whether the string comparison SHOULD ignore nonspacing combining characters, such as diacritics.
IgnoreKanaType	Indicates whether the string comparison SHOULD ignore the Kana type.
IgnoreWidth	Indicates whether the string comparison SHOULD ignore the character width.

2.1.3 TEntitySet

The **TEntitySet** complex type annotates the **EntitySet** element, as defined in [\[MC-CSDL\]](#) section 2.1.18. The **EntitySet** element defines a named set that can contain instances of an **entity**. More than one **EntitySet** element for a particular **EntityType** can be defined.

The **TEntitySet** complex type is defined in the schema as follows.

```
<xs:complexType name="TEntitySet">
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
</xs:complexType>
```

The attributes that are defined by the **TEntitySet** complex type are specified in the following table.

Attribute	Description
Caption	Contains a user-friendly display name for the entity. If no caption is set in the model, no caption is displayed.
CollectionCaption	Contains the plural name for the entity.
ReferenceName	Contains the unmerged and fully qualified name of the entity, that is, the original CubeDimension ([MS-SSAS] section 2.2.4.2.2.9.1) name before munging.
Hidden	Indicates whether the entity is hidden. If the value of this attribute is "true", the entity is hidden.

2.1.4 TAssociationSet

The **TAssociationSet** complex type annotates the **AssociationSet** element, as defined in [\[MC-CSDL\]](#) section 2.1.19. There is one **association** set for every relationship between two entity types (defined by **EntityType** elements). An association set provides a definition for grouping association instances so that they can be mapped to a data source.

The **TAssociationSet** complex type is defined in the schema as follows.

```
<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
</xs:complexType>
```

The attributes that are defined by the **TAssociationSet** complex type are specified in the following table.

Attribute	Description
State	Indicates the state of an association set. The contents of this attribute are defined by the TState simple type (section 2.1.4.1). Where multiple association sets connect two EntitySets , no more than one association set can be marked as active.
Hidden	Indicates whether the association set will be hidden from the client. If the value of this attribute is "true", the association set will be hidden.

2.1.4.1 TState

The **TState** simple type enumerates the states that can be assigned to an association set.

The **TState** simple type is defined in the schema as follows.

```
<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TState** simple type are specified in the following table.

Value	Meaning
Active	The association set is active.
Inactive	The association set is inactive.

2.1.5 TEntityType

The **TEntityType** complex type annotates the **EntityType** element, as defined in [\[MC-CSDL\]](#) section 2.1.2. The **EntityType** element represents the structure of a top-level concept, such as a customer or order, in a conceptual model. An entity type is a template for instances of entity types in an application.

The **TEntityType** complex type is defined in the schema as follows.

```
<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
            maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
            maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="Hierarchy" type="bi:THierarchy" minOccurs="0"
      maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="Contents" type="bi:TEntityContents" default="Regular"
    use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>
```

The elements and attributes that are defined by the **TEntityType** complex type are specified in the following tables.

Element	Description
DisplayKey	A list of references to columns or to role ends that constitutes a strong identifier that uniquely identifies an entity instance. The list SHOULD be unique. However, the SSAS protocol [MS-SSAS] , which provides CSDLBI output, does not verify that the list is unique.

Element	Description
DefaultDetails	A list of property references that, together, represent the larger set of columns in the table. A single property MUST be a column or a measure .
DefaultImage	A reference to a column that contains the image that illustrates the entity. In the Unified Dimensional Model (UDM), this element is represented by a binary attribute on the dimension attribute. If this element is present, it MUST contain exactly one MemberRef element whose contents are defined by the TMemberRef complex type (section 2.1.7).
DefaultMeasure	A reference to a measure that is used as the default representation for multiple instances of the entity. If this element is present, it MUST contain exactly one MemberRef element whose contents are defined by the TMemberRef complex type (section 2.1.7).
SortMembers	A list of properties on which to sort. TSortDirection (section 2.1.13.2) provides a hint to the sort engine about whether the order is ascending or descending.
Hierarchy	A list of hierarchies (THierarchy , section 2.1.8).

Attribute	Description
Contents	The type of data in the entity. The contents of this attribute are defined by the TEntityContents simple type (section 2.1.5.1).
ReferenceName	The identifier that references this entity in a Data Analysis Expressions (DAX) query. If this attribute is omitted, the field name is used.

2.1.5.1 TEntityContents

The **TEntityContents** simple type enumerates the possible types of data in an entity.

The **TEntityContents** simple type is defined in the schema as follows.

```
<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillOfMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TEntityContents** simple type are specified in the following table.

Value	Meaning
Regular	A dimension whose type has not been set to a special dimension type.
Time	A dimension whose attributes represent time periods, such as years, semesters, quarters, months, or days.
Geography	A dimension whose attributes represent geographic information, such as cities or postal codes.
Organization	A dimension whose attributes represent organizational information, such as employees or subsidiaries.
BillOfMaterials	A dimension whose attributes represent inventory or manufacturing information, such as parts lists for products.
Accounts	A dimension whose attributes represent a chart of accounts for financial reporting.
Customers	A dimension whose attributes represent customer or contact information.
Products	A dimension whose attributes represent product information.
Scenario	A dimension whose attributes represent planning or strategic analysis information.
Quantitative	A dimension whose attributes represent quantitative information.
Utility	A dimension whose attributes represent miscellaneous information.
Currency	A dimension that contains currency data and metadata.
Rates	A dimension whose attributes represent currency rate information.
Channel	A dimension whose attributes represent channel information.
Promotion	A dimension whose attributes represent marketing promotion information.

The default value is "Regular".

2.1.6 TMemberRefs

The **TMemberRefs** complex type defines a **collection** of members in which each member is contained in a **MemberRef** element.

The **TMemberRefs** complex type is defined in the schema as follows.

```
<xs:complexType name="TMemberRefs" >
  <xs:sequence>
    <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
      maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

The element that is defined by the **TMemberRefs** complex type is specified in the following table.

Element	Description
---------	-------------

Element	Description
MemberRef	A collection of members.

2.1.7 TMemberRef

The **TMemberRef** complex type identifies the name of the property that is contained in a **MemberRef** element.

The **TMemberRef** complex type is defined in the schema as follows.

```
<xs:complexType name="TMemberRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>
```

The attribute that is defined by the **TMemberRef** complex type is specified in the following table.

Attribute	Description
Name	The name of the property contained in a MemberRef element.

2.1.8 THierarchy

In CSDLBI 1.1, the **THierarchy** complex type specifies the content of a hierarchy. A hierarchy exposes the same set of attributes as do other members, such as columns (that are exposed as properties) and measures. Therefore, the **THierarchy** type is derived from the base **TMember** type (section [2.1.9](#)).

The **THierarchy** complex type is defined in the schema as follows.

```
<xs:complexType name="THierarchy">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Documentation" type="bi:TDocumentation"
          minOccurs="0" maxOccurs="1" />
        <xs:element name="Level" type="bi:TLevel" minOccurs="1"
          maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The elements that are defined by the **THierarchy** complex type are specified in the following table.

Element	Description
Documentation	A description of the hierarchy. The contents of this element are defined by the TDocumentation complex type (section 2.1.10).
Level	A single level of the hierarchy. The contents of this element are defined by the TLevel type (section 2.1.11). The number of Level elements that can be specified is at least one, with no upper limit.

2.1.9 TMember

The **TMember** complex type is a base type. Its attributes can appear in columns, measures, navigation properties, hierarchies, and levels.

The **TMember** complex type is defined in the schema as follows.

```
<xs:complexType name="TMember" abstract="true">
  <xs:attribute name="Name" type="xs:string" use="required" />
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule"
    default="None" />
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
  <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>
```

The attributes that are defined by the **TMember** complex type are specified in the following table.

Attribute	Description
Name	The name given to the member (a column, measure, navigation property, hierarchy, or level) that is defined by the implementation of the TMember type.
Caption<1>	The display name for the member.
ContextualNameRule	The naming format that is used to disambiguate members. The contents of this attribute are defined by the TContextualNameRule simple type (section 2.1.9.1).
Hidden	A boolean value that indicates whether the member will be hidden from the client. If the value of this attribute is "true", the member will be hidden.
ReferenceName	The identifier that is used to reference the member in a DAX query. If this attribute is omitted, the field name is used.

2.1.9.1 TContextualNameRule

The **TContextualNameRule** simple type enumerates the naming formats that can be used to disambiguate members. **TContextualNameRule** provides a hint to client applications for creating unambiguous names for **CalculationProperty**, as defined in [\[MS-SSAS\]](#) section 2.2.4.2.2.10.1.

The **TContextualNameRule** simple type is defined in the schema as follows.

```
<xs:simpleType name="TContextualNameRule">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None" />
    <xs:enumeration value="Context" />
    <xs:enumeration value="Merge" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TContextualNameRule** simple type are specified in the following table.

Value	Meaning
None	Use the attribute name.

Value	Meaning
Context	Use the incoming relationship name.
Merge	Concatenate the incoming relationship name and the CalculationProperty name, in compliance with the language grammar.

2.1.10 TDocumentation

The **TDocumentation** complex type defines the contents of the **Documentation** element. The **Documentation** element provides information about an object that is defined in the parent element that contains the **Documentation** element.

The **TDocumentation** complex type is defined in the schema as follows.

```
<xs:complexType name="TDocumentation">
  <xs:sequence>
    <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>
```

The element that is defined by the **TDocumentation** complex type is specified in the following table.

Element	Description
Summary	A description of a parent element's object.

2.1.11 TLevel

The **TLevel** complex type specifies a hierarchy level. The **TLevel** type is derived from the base **TMember** type (section [2.1.9](#)).

The **TLevel** complex type is defined in the schema as follows.

```
<xs:complexType name="TLevel">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Source" minOccurs="0" maxOccurs="1" >
          <xs:complexType >
            <xs:sequence>
              <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
                maxOccurs="1" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The elements that are defined by the **TLevel** complex type are specified in the following table.

Element	Description
Source	A container element for the PropertyRef element.
Source.PropertyRef	A property reference that points back to an instance property. Caption, description, name, and reference name can be drawn from the referenced instance property, if it is not specified for the TLevel complex type.

2.1.12 TProperty

The **TProperty** complex type annotates the **Property** element that is defined in [\[MC-CSDL\]](#) section 2.1.3. The **TProperty** complex type is an extension of the **TBaseProperty** complex type (section [2.1.13](#)) that adds attributes that appear only in instance columns.

The **TProperty** complex type is defined in the schema as follows.

```
<xs:complexType name="TProperty">
  <xs:complexContent>
    <xs:extension base="bi:TBaseProperty">
      <xs:sequence >
        <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0"
          maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="Contents" type="bi:TContents" use="optional"
        default="Regular"/>
      <xs:attribute name="DefaultAggregateFunction"
        type="bi:TDefaultAggregateFunction" default="Default" />
      <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
        default="GroupOnValue"/>
      <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The element and attributes that are defined by the **TProperty** complex type are specified in the following tables.

Element	Description
OrderBy	A reference to another property within the model that defines the sort order for that property's values. The values for the two properties SHOULD have a 1-to-1 mapping. Otherwise, the sort behavior is undefined. If this element is omitted, the properties are sorted based on their values.

Attribute	Description
Contents	The type of data in a column. This value is drawn from the DimensionAttribute complex type, as defined in [MS-SSAS] section 2.2.4.2.2.8.1. The contents of this attribute are defined by the TContents simple type (section 2.1.12.1).
DefaultAggregateFunction	A value that indicates the default aggregate function, if any, that is typically used to summarize properties. The contents of this attribute are defined by

Attribute	Description
	the TDefaultAggregateFunction simple type (section 2.1.12.2).
GroupingBehavior	A value that specifies how query results are grouped. The attribute's contents are defined by the TGroupingBehavior simple type (section 2.1.12.3).
Stability	An attribute that specifies the stability of a declared property between refresh operations. This attribute is set on columns that contain a row number or other volatile value (such as NOW()). This attribute is emitted only for an unstable value. The contents of this attribute are defined by the TStability simple type (section 2.1.12.4).

2.1.12.1 TContents

The **TContents** simple type is a string that contains the possible types of data in a column. The **TContents** value is derived from the **DimensionAttributeTypeEnumType** simple type that is included in the definition of the **DimensionAttribute** complex type, as specified in [\[MS-SSAS\]](#) section 2.2.4.2.2.8.1. If the enumeration value in **DimensionAttributeTypeEnumType** is "ExtendedType", the **TContents** value is derived from the **ExtendedType** element of **DimensionAttribute**. The client is not required to respond to these values.

The **TContents** simple type is defined in the schema as follows.

```
<xs:simpleType name="TContents">
  <xs:restriction base="xs:string" />
</xs:simpleType>
```

2.1.12.2 TDefaultAggregateFunction

The **TDefaultAggregateFunction** simple type enumerates the aggregate functions that can be used by reporting tools to summarize attribute values.

The **TDefaultAggregateFunction** simple type is defined in the schema as follows.

```
<xs:simpleType name="TDefaultAggregateFunction" >
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="None" />
    <xs:enumeration value="Sum" />
    <xs:enumeration value="Count" />
    <xs:enumeration value="Average" />
    <xs:enumeration value="Min" />
    <xs:enumeration value="Max" />
    <xs:enumeration value="DistinctCount" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TDefaultAggregateFunction** simple type are specified in the following table.

Value	Meaning
Default	Automatically selects the appropriate aggregate function based on the data type.

Value	Meaning
None	Does not use aggregate functions.
Sum	Uses the aggregate function Sum .
Count	Uses the aggregate function Count .
Average	Uses the aggregate function Average .
Min	Uses the aggregate function Min .
Max	Uses the aggregate function Max .
DistinctCount	Uses the aggregate function DistinctCount .

2.1.12.3 TGroupingBehavior

The **TGroupingBehavior** simple type enumerates the options that are available for building queries in a hierarchy.

The **TGroupingBehavior** simple type is defined in the schema as follows.

```
<xs:simpleType name="TGroupingBehavior" >
  <xs:restriction base="xs:string" >
    <xs:enumeration value="GroupOnValue" />
    <xs:enumeration value="GroupOnEntityKey" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TGroupingBehavior** simple type are specified in the following table.

Value	Meaning
GroupOnValue	Group by value.
GroupOnEntityKey	Group by entity key.

The following example illustrates the meaning of these two values. The example involves a query to show the total payroll deductions for Brian Smith. If the value "GroupOnValue" is used, the result shows the payroll deductions of all Brian Smiths that are in the database totaled together. If the value "GroupOnEntityKey" is used, the result shows the payroll deductions for each Brian Smith in the database.

2.1.12.4 TStability

The **TStability** simple type enumerates the acceptable values for specifying the stability of a declared property between refresh operations.

The **TStability** simple type is defined in the schema as follows.

```
<xs:simpleType name="TStability">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Stable" />
    <xs:enumeration value="RowNumber" />
  </xs:restriction>
</xs:simpleType>
```

```

    <xs:enumeration value="Volatile" />
  </xs:restriction>
</xs:simpleType>

```

The possible values for the **TStability** simple are specified in the following table.

Value	Meaning
Stable	The property remains constant between refresh operations.
RowNumber	The property contains a row number.
Volatile	The property might not remain constant between refresh operations.

2.1.13 TBaseProperty

The **TBaseProperty** complex type is an extension of the **TMember** type (section [2.1.9](#)) that adds attributes that appear only in columns and measures.

The **TBaseProperty** complex type is defined in the schema as follows.

```

<xs:complexType name="TBaseProperty" abstract="true">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
      <xs:attribute name="FormatString" type="xs:string" use="optional"/>
      <xs:attribute name="Units" type="xs:string" use="optional" />
      <xs:attribute name="SortDirection" type="bi:TSortDirection"
        default="Default"/>
      <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

The attributes that are defined by the **TBaseProperty** complex type are specified in the following table.

Attribute	Description
Alignment	A value that indicates how the field values SHOULD be aligned in a tabular presentation. If this attribute is omitted, the default determines the alignment based on the field's data type. The contents of this attribute are defined by the TAlignment simple type (section 2.1.13.1).
FormatString	A .NET format string that defines the default client formatting for date and time values. If this attribute is omitted, the following .NET format string values are assumed: <ul style="list-style-type: none"> ▪ Integer fields: "g" ▪ Decimal data type fields: "#,0.00" ▪ Double data type fields: "#,0.00" ▪ Date and time fields: "d"

Attribute	Description
	For all other kinds of fields, no format string applies.
Units	The symbol that is applied to field values to express units. If this attribute is omitted, the units are assumed to be unknown.
SortDirection	A value that indicates how the field values are typically sorted. If this attribute is omitted, the default value assigns a sort direction based on the field's data type. The contents of this attribute are defined by the TSortDirection simple type (section 2.1.13.2).
IsRightToLeft	A boolean value that indicates whether the field contains text that MAY be read from right to left. If this attribute is omitted, the model setting is assumed.

2.1.13.1 TAlignment

The **TAlignment** simple type enumerates the types of justification that can be used in a column.

The **TAlignment** simple type is defined in the schema as follows.

```
<xs:simpleType name="TAlignment">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Left" />
    <xs:enumeration value="Right" />
    <xs:enumeration value="Center" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TAlignment** simple type are specified in the following table.

Value	Meaning
Default	Automatically sets the appropriate justification that corresponds to the data type.
Left	Sets the justification to left-aligned.
Right	Sets the justification to right-aligned.
Center	Sets the justification to center-aligned.

2.1.13.2 TSortDirection

The **TSortDirection** simple type enumerates sort directions.

The **TSortDirection** simple type is defined in the schema as follows.

```
<xs:simpleType name="TSortDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Ascending" />
    <xs:enumeration value="Descending" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TSortDirection** simple type are specified in the following table.

Value	Meaning
Default	The default sort direction. The default is based on data type.
Ascending	The ascending sort direction.
Descending	The descending sort direction.

2.1.14 TPropertyRefs

The **TPropertyRefs** complex type defines a collection of properties, with each property contained in a **PropertyRef** element.

The **TPropertyRefs** complex type is defined in the schema as follows.

```
<xs:complexType name="TPropertyRefs" >
  <xs:sequence>
    <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
      maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

The element that is defined by the **TPropertyRefs** complex type is specified in the following table.

Element	Description
PropertyRef	A collection of properties.

2.1.15 TPropertyRef

The **TPropertyRef** complex type identifies the name of the property that is contained in a **PropertyRef** element (see section [2.1.14](#)). The **PropertyRef** name MUST match the name of one of the **Property** elements within the same **EntityType** element, as defined in [\[MC-CSDL\]](#) section 2.1.2.

The **TPropertyRef** complex type is defined in the schema as follows.

```
<xs:complexType name="TPropertyRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>
```

The attribute that is defined by the **TPropertyRef** complex type is specified in the following table.

Attribute	Description
Name	The name of a property that is contained in a PropertyRef element.

2.1.16 TMeasure

The **TMeasure** complex type is an extension of the **TProperty** type (section [2.1.12](#)), adding components that appear only in measures.

The **TMeasure** complex type is defined in the schema as follows.

```
<xs:complexType name="TMeasure">
  <xs:complexContent>
    <xs:extension base="bi:TProperty">
      <xs:sequence>
        <xs:element name="Kpi" type="bi:TKpi" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The element and attribute that are defined by the **TMeasure** complex type are specified in the following tables.

Element	Description
Kpi	A key performance indicator (KPI). The contents of this element are defined by the TKpi complex type (section 2.1.17).

Attribute	Description
IsSimpleMeasure	A boolean value that indicates whether the formula that is used in the measure is one of the simple aggregations (Sum, Count, Min, Max, Avg, DistinctCount). The value "true" means that one of the simple aggregations is used. The actual value is derived from the IsSimpleMeasure element in the model, as specified in [MS-SSAS] section 2.2.4.2.2.10.2.

2.1.17 TKpi

In CSDLBI 1.1, the **TKpi** complex type defines a calculation that can be used as a KPI. In a business intelligence data model, a KPI is based on a measure. The definition of the KPI contains all the metadata that is associated with measures and information that is needed for the presentation of the KPI values.

The **TKpi** complex type does not specify the formula that is contained in the measure definition. Instead, it specifies the additional metadata that is associated with measures that are used as KPIs. After a measure is designated as a KPI, it SHOULD be exposed only as a KPI.

The **TKpi** complex type lists attributes that SHOULD be included only with a **TMeasure** complex type (section [2.1.16](#)).

The **TKpi** complex type is defined in the schema as follows.

```
<xs:complexType name="TKpi">
  <xs:sequence >
    <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0"
      maxOccurs="1" />
    <xs:element name="KpiGoal" minOccurs="1" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
```

```

        maxOccurs="1" />
    </xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="KpiStatus" minOccurs="1" maxOccurs="1" >
    <xs:complexType >
        <xs:sequence>
            <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
                maxOccurs="1" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
</xs:sequence>
<xs:attribute name="StatusGraphic" type="xs:string" use="required"/>
</xs:complexType>

```

The elements and attribute that are defined by the **TKpi** complex type are specified in the following tables.

Element	Description
Documentation <2>	An element that contains information about the KPI. The contents of this element are defined by the TDocumentation complex type (section 2.1.10).
KpiGoal	An element that contains the reference to the column that contains the KPI goal value. This element MUST contain exactly one PropertyRef element (see section 2.1.14). The contents of this element are defined by the TPropertyRef complex type (section 2.1.15).
KpiStatus	An element that contains the reference to a column that contains the value as the status indicator in a KPI. This element MUST contain exactly one PropertyRef element (see section 2.1.14). The contents of this element are defined by the TPropertyRef complex type (section 2.1.15).

Attribute	Description
StatusGraphic	A reference to an image that indicates negative, neutral, or positive progress against the targets defined in the KPI.

2.1.18 TNavigationProperty

The **TNavigationProperty** complex type annotates the **NavigationProperty** element, as defined in [\[MC-CSDL\]](#) section 2.1.4. The **TNavigationProperty** complex type is an extension of the **TMember** complex type (section [2.1.9](#)), adding an attribute that appears only in navigation properties.

The **TNavigationProperty** complex type is defined in the schema as follows.

```

<xs:complexType name="TNavigationProperty">
    <xs:complexContent>
        <xs:extension base="bi:TMember">
            <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>

```

```
</xs:complexContent>  
</xs:complexType>
```

The attribute that is defined by the **TNavigationProperty** complex type is specified in the following table.

Attribute	Description
CollectionCaption	Plural name for referring to a set of instances of the navigation property. If this attribute is omitted, the TMember.Caption attribute is used.

3 Structure Examples

The following samples of CSDLBI code are annotated structures that are populated with values that represent common use cases. The examples illustrate the structures that are specified in this document, but do not cover all possible usage scenarios. These samples are not intended to replace this specification but only to clarify and enhance the specification.

3.1 CSDLBI 1.0 Example

```
<Schema xmlns="http://schemas.microsoft.com/ado/2008/09/edm"
xmlns:edm_annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions" bi:Version="1.0"
Namespace="Sandbox">
  <EntityContainer Name="Sandbox">
    <Documentation>
      <Summary>DescriptionRolePlayingDimensionsDB</Summary>
    </Documentation>
    <EntitySet Name="DimCustomer" EntityType="Sandbox.DimCustomer">
      <Documentation>
        <Summary>Description_Dimension_DimCustomer</Summary>
      </Documentation>
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimEmployee" EntityType="Sandbox.DimEmployee">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimGeography" EntityType="Sandbox.DimGeography">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProduct" EntityType="Sandbox.DimProduct">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProductCategory" EntityType="Sandbox.DimProductCategory">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProductSubcategory"
EntityType="Sandbox.DimProductSubcategory">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimStore" EntityType="Sandbox.DimStore">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimTime" EntityType="Sandbox.DimTime">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="FactInternetSales" EntityType="Sandbox.FactInternetSales">
      <bi:EntitySet />
    </EntitySet>
    <AssociationSet Name="DimCustomer_DimGeography_Geography"
Association="Sandbox.DimCustomer_DimGeography_Geography">
      <End EntitySet="DimCustomer" />
      <End EntitySet="DimGeography" />
      <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="DimProduct_DimProductSubcategory_Subcategory"
Association="Sandbox.DimProduct_DimProductSubcategory_Subcategory">
      <End EntitySet="DimProduct" />
      <End EntitySet="DimProductSubcategory" />
    </AssociationSet>
  </EntityContainer>
</Schema>
```

```

        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="DimProductSubcategory_DimProductCategory_Category"
Association="Sandbox.DimProductSubcategory_DimProductCategory_Category">
        <End EntitySet="DimProductSubcategory" />
        <End EntitySet="DimProductCategory" />
    <bi:AssociationSet />
</AssociationSet>
    <AssociationSet Name="DimStore_DimGeography_Geography2"
Association="Sandbox.DimStore_DimGeography_Geography2">
        <End EntitySet="DimStore" />
        <End EntitySet="DimGeography" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimCustomer_Customer2"
Association="Sandbox.FactInternetSales_DimCustomer_Customer2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimCustomer" />
    <bi:AssociationSet />
</AssociationSet>
    <AssociationSet Name="FactInternetSales_DimCustomer_Customer_2"
Association="Sandbox.FactInternetSales_DimCustomer_Customer_2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimCustomer" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimTime_Time"
Association="Sandbox.FactInternetSales_DimTime_Time">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimTime" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimTime_Time_2"
Association="Sandbox.FactInternetSales_DimTime_Time_2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimTime" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimTime_Time_3"
Association="Sandbox.FactInternetSales_DimTime_Time_3">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimTime" />
    <bi:AssociationSet />
</AssociationSet>
    <AssociationSet Name="FactInternetSales_DimStore_Store2"
Association="Sandbox.FactInternetSales_DimStore_Store2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimStore" />
    <bi:AssociationSet />
</AssociationSet>
    <AssociationSet Name="FactInternetSales_DimEmployee_Employee"
Association="Sandbox.FactInternetSales_DimEmployee_Employee">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimEmployee" />
    <bi:AssociationSet />
</AssociationSet>
    <AssociationSet Name="FactInternetSales_DimProduct_Product2"
Association="Sandbox.FactInternetSales_DimProduct_Product2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimProduct" />

```

```

        <bi:AssociationSet />
    </AssociationSet>
    <bi:EntityContainer Caption="CaptionRolePlayingDimensionsDB" Culture="ja-JP">
        <bi:CompareOptions IgnoreCase="true" IgnoreKanaType="true" IgnoreWidth="true"
/>

    </bi:EntityContainer>
</EntityContainer>
<EntityType Name="DimCustomer">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="CustomerKey" Type="Int64" Nullable="false">
        <Documentation>
            <Summary>Description_Dimension_CustomerKey</Summary>
        </Documentation>
        <bi:Property Caption="Caption_Dimension_CustomerKey" Hidden="true">
            <bi:OrderBy>
                <bi:PropertyRef Name="GeographyKey" />
            </bi:OrderBy>
        </bi:Property>
    </Property>
    <Property Name="GeographyKey" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="CustomerAlternateKey" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Title" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property ContextualNameRule="Context" Alignment="Left" Units="money"
SortDirection="Ascending" IsRightToLeft="true" DefaultAggregateFunction="Max" />
    </Property>
    <Property Name="FirstName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
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ToRole="Geography">
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        </Documentation>
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        </bi:DefaultDetails>
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    </Property>
    <Property Name="EndDate" Type="DateTime">
        <bi:Property />
    </Property>
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FixedLength="false">
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ToRole="Subcategory">
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    </Property>
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    <Property Name="SpanishProductCategoryName" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
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Unicode="true" FixedLength="false">
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    <Property Name="FrenchProductSubcategoryName" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
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    </Property>
    <Property Name="ProductCategoryKey" Type="Int64">
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FromRole="Subcategory2" ToRole="Category">
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    </NavigationProperty>
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FixedLength="false">
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    </Property>
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/>
    </Property>
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Relationship="Sandbox.DimStore_DimGeography_Geography2" FromRole="Store" ToRole="Geography2">
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Unicode="true" FixedLength="false">
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  </Property>
  <Property Name="FrenchDayNameOfWeek" Type="String" MaxLength="Max" Unicode="true"
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  </Property>
  <Property Name="DayNumberOfYear" Type="Int64">
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  </Property>
  <Property Name="WeekNumberOfYear" Type="Int64">
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  <Property Name="SpanishMonthName" Type="String" MaxLength="Max" Unicode="true"
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    <Property Name="ShipDateKey" Type="Int64">
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    </Property>
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</Property>
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</Property>
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  </Documentation>
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ContextualNameRule="Context" Alignment="Right"
FormatString="&quot;,$&quot;#,0.00; (&quot;,$&quot;#,0.00) ;&quot;,$&quot;#,0.00" Units="money"
SortDirection="Ascending" IsRightToLeft="true" IsSimpleMeasure="true" />
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Relationship="Sandbox.FactInternetSales_DimCustomer_Customer2" FromRole="Sales"
ToRole="Customer2">
    <bi:NavigationProperty ContextualNameRule="Merge" />
  </NavigationProperty>

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ToRole="Customer_2">
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Relationship="Sandbox.FactInternetSales_DimTime_Time" FromRole="Sales3" ToRole="Time">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Time_2"
Relationship="Sandbox.FactInternetSales_DimTime_Time_2" FromRole="Sales4" ToRole="Time_2">
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    </NavigationProperty>
    <NavigationProperty Name="Time_3"
Relationship="Sandbox.FactInternetSales_DimTime_Time_3" FromRole="Sales5" ToRole="Time_3">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Store2"
Relationship="Sandbox.FactInternetSales_DimStore_Store2" FromRole="Sales6" ToRole="Store2">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Employee"
Relationship="Sandbox.FactInternetSales_DimEmployee_Employee" FromRole="Sales7"
ToRole="Employee">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Product2"
Relationship="Sandbox.FactInternetSales_DimProduct_Product2" FromRole="FactInternetSales"
ToRole="Product2">
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        <bi:DefaultMeasure>
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        </bi:DefaultMeasure>
    </bi:EntityType>
</EntityType>
<Association Name="DimCustomer_DimGeography_Geography">
    <End Role="Customer" Type="Sandbox.DimCustomer" Multiplicity="*" />
    <End Role="Geography" Type="Sandbox.DimGeography" Multiplicity="0..1" />
</Association>
<Association Name="DimProduct_DimProductSubcategory_Subcategory">
    <End Role="Product" Type="Sandbox.DimProduct" Multiplicity="*" />
    <End Role="Subcategory" Type="Sandbox.DimProductSubcategory" Multiplicity="0..1"
/>
</Association>
<Association Name="DimProductSubcategory_DimProductCategory_Category">
    <End Role="Subcategory2" Type="Sandbox.DimProductSubcategory" Multiplicity="*" />
    <End Role="Category" Type="Sandbox.DimProductCategory" Multiplicity="0..1" />
</Association>
<Association Name="DimStore_DimGeography_Geography2">
    <End Role="Store" Type="Sandbox.DimStore" Multiplicity="*" />
    <End Role="Geography2" Type="Sandbox.DimGeography" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimCustomer_Customer2">
    <End Role="Sales" Type="Sandbox.FactInternetSales" Multiplicity="*" />
    <End Role="Customer2" Type="Sandbox.DimCustomer" Multiplicity="0..1" />

```

```

</Association>
<Association Name="FactInternetSales_DimCustomer_Customer_2">
  <End Role="Sales2" Type="Sandbox.FactInternetSales" Multiplicity="*" />
  <End Role="Customer_2" Type="Sandbox.DimCustomer" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimTime_Time">
  <End Role="Sales3" Type="Sandbox.FactInternetSales" Multiplicity="*" />
  <End Role="Time" Type="Sandbox.DimTime" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimTime_Time_2">
  <End Role="Sales4" Type="Sandbox.FactInternetSales" Multiplicity="*" />
  <End Role="Time_2" Type="Sandbox.DimTime" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimTime_Time_3">
  <End Role="Sales5" Type="Sandbox.FactInternetSales" Multiplicity="*" />
  <End Role="Time_3" Type="Sandbox.DimTime" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimStore_Store2">
  <End Role="Sales6" Type="Sandbox.FactInternetSales" Multiplicity="*" />
  <End Role="Store2" Type="Sandbox.DimStore" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimEmployee_Employee">
  <End Role="Sales7" Type="Sandbox.FactInternetSales" Multiplicity="*" />
  <End Role="Employee" Type="Sandbox.DimEmployee" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimProduct_Product2">
  <End Role="FactInternetSales" Type="Sandbox.FactInternetSales" Multiplicity="*"
/>
  <End Role="Product2" Type="Sandbox.DimProduct" Multiplicity="0..1" />
</Association>
</Schema>

```

3.2 CSDLBI 1.1 Example

```

<Schema xmlns="http://schemas.microsoft.com/ado/2008/09/edm"
xmlns:edm_annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions" bi:Version="1.1"
Namespace="Sandbox">
  <EntityContainer Name="Sandbox">
    <EntitySet Name="Bike" EntityType="Sandbox.Bike">
      <bi:EntitySet Hidden="true" />
    </EntitySet>
    <EntitySet Name="BikeSales" EntityType="Sandbox.BikeSales">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="BikeSubcategory" EntityType="Sandbox.BikeSubcategory">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="CalendarQuarter" EntityType="Sandbox.CalendarQuarter">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="Country" EntityType="Sandbox.Country">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="Currency" EntityType="Sandbox.Currency">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="SalesChannel" EntityType="Sandbox.SalesChannel">
      <bi:EntitySet />
    </EntitySet>
  </EntityContainer>

```

```

    </EntitySet>
    <AssociationSet Name="Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey"
Association="Sandbox.Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey">
      <End EntitySet="Bike" />
      <End EntitySet="BikeSubcategory" />
      <bi:AssociationSet Hidden="true" />
    </AssociationSet>
    <AssociationSet Name="BikeSales_Bike_Bike_ProductKey"
Association="Sandbox.BikeSales_Bike_Bike_ProductKey">
      <End EntitySet="BikeSales" />
      <End EntitySet="Bike" />
      <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter"
Association="Sandbox.BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter">
      <End EntitySet="BikeSales" />
      <End EntitySet="CalendarQuarter" />
      <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="BikeSales_Country_Country_CountryCode"
Association="Sandbox.BikeSales_Country_Country_CountryCode">
      <End EntitySet="BikeSales" />
      <End EntitySet="Country" />
      <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="BikeSales_Currency_Currency_CurrencyKey"
Association="Sandbox.BikeSales_Currency_Currency_CurrencyKey">
      <End EntitySet="BikeSales" />
      <End EntitySet="Currency" />
      <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="BikeSales_SalesChannel_SalesChannel_SalesChannelCode"
Association="Sandbox.BikeSales_SalesChannel_SalesChannel_SalesChannelCode">
      <End EntitySet="BikeSales" />
      <End EntitySet="SalesChannel" />
      <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <bi:EntityContainer Caption="CSDLTest" Culture="en-US">
      <bi:CompareOptions IgnoreCase="true" />
    </bi:EntityContainer>
  </EntityContainer>
  <EntityType Name="Bike">
    <Key>
      <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
      <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="ProductKey" Type="Int64" Nullable="false">
      <bi:Property />
    </Property>
    <Property Name="ProductAlternateKey" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
      <bi:Property />
    </Property>
    <Property Name="ProductSubcategoryKey" Type="Int64">
      <bi:Property />
    </Property>
    <Property Name="ProductName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">

```

```

        <bi:Property />
    </Property>
    <Property Name="StandardCost" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="FinishedGoodsFlag" Type="Boolean">
        <bi:Property />
    </Property>
    <Property Name="Color" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property ContextualNameRule="Context" Alignment="Left" Units="counts"
SortDirection="Descending" IsRightToLeft="true" DefaultAggregateFunction="Max" />
    </Property>
    <Property Name="ListPrice" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="Size" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="SizeRange" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Weight" Type="Double">
        <bi:Property />
    </Property>
    <Property Name="DealerPrice" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="Class" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Style" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="ModelName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Description" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="WeightUnitMeasureCode" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="SizeUnitMeasureCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="SafetyStockLevel" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="ReorderPoint" Type="Int64">
        <bi:Property />
    </Property>

```

```

    <Property Name="DaysToManufacture" Type="Int64">
      <bi:Property />
    </Property>
    <Property Name="ProductLine" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
      <bi:Property />
    </Property>
    <NavigationProperty Name="BikeSubcategory_ProductSubcategoryKey"
Relationship="Sandbox.Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey"
FromRole="Bike_ProductSubcategoryKey" ToRole="BikeSubcategory_ProductSubcategoryKey">
      <bi:NavigationProperty />
    </NavigationProperty>
    <bi:EntityType>
      <bi:DisplayKey>
        <bi:MemberRef Name="Color" />
      </bi:DisplayKey>
      <bi:DefaultDetails>
        <bi:MemberRef Name="Color" />
      </bi:DefaultDetails>
      <bi:SortMembers>
        <bi:MemberRef Name="Color" />
      </bi:SortMembers>
      <bi:Hierarchy Name="Product_Hierarchy" Caption="Product Hierarchy"
ReferenceName="Product Hierarchy">
        <bi:Documentation>
          <bi:Summary>DESCRIPTION_ProductModelCateg_Hierarchies</bi:Summary>
        </bi:Documentation>
        <bi:Level Name="ProductLine">
          <bi:Source>
            <bi:PropertyRef Name="ProductLine" />
          </bi:Source>
        </bi:Level>
        <bi:Level Name="ModelName">
          <bi:Source>
            <bi:PropertyRef Name="ModelName" />
          </bi:Source>
        </bi:Level>
      </bi:Hierarchy>
    </bi:EntityType>
  </EntityType>
  <EntityType Name="BikeSales">
    <Key>
      <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
      <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="SalesOrderNumber" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
      <bi:Property />
    </Property>
    <Property Name="SalesOrderLineNumber" Type="Int64">
      <bi:Property />
    </Property>
    <Property Name="RevisionNumber" Type="Int64">
      <bi:Property />
    </Property>
    <Property Name="ProductKey" Type="Int64">
      <bi:Property />
    </Property>
  </EntityType>

```

```

        </Property>
        <Property Name="CountryCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
            <bi:Property />
        </Property>
        <Property Name="CurrencyKey" Type="Int64">
            <bi:Property />
        </Property>
        <Property Name="CalendarQuarter" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
            <bi:Property />
        </Property>
        <Property Name="SalesChannelCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
            <bi:Property />
        </Property>
        <Property Name="OrderQuantity" Type="Int64">
            <bi:Property />
        </Property>
        <Property Name="UnitPrice" Type="Decimal" Precision="19" Scale="4">
            <bi:Property />
        </Property>
        <Property Name="ExtendedAmount" Type="Decimal" Precision="19" Scale="4">
            <bi:Property />
        </Property>
        <Property Name="UnitPriceDiscountPct" Type="Double">
            <bi:Property />
        </Property>
        <Property Name="DiscountAmount" Type="Double">
            <bi:Property />
        </Property>
        <Property Name="ProductStandardCost" Type="Decimal" Precision="19" Scale="4">
            <bi:Property />
        </Property>
        <Property Name="TotalProductCost" Type="Decimal" Precision="19" Scale="4">
            <bi:Property />
        </Property>
        <Property Name="SalesAmount" Type="Decimal" Precision="19" Scale="4">
            <bi:Property />
        </Property>
        <Property Name="TaxAmt" Type="Decimal" Precision="19" Scale="4">
            <bi:Property />
        </Property>
        <Property Name="Freight" Type="Decimal" Precision="19" Scale="4">
            <bi:Property />
        </Property>
        <Property Name="CarrierTrackingNumber" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
            <bi:Property />
        </Property>
        <Property Name="CustomerPONumber" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
            <bi:Property />
        </Property>
        <Property Name="CustomerAccountNumber" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
            <bi:Property />
        </Property>
        <Property Name="Sum_of_TotalProductCost" Type="Decimal" Precision="19" Scale="4">

```

```

        <bi:Measure Caption="Sum of TotalProductCost" ReferenceName="Sum of
TotalProductCost" FormatString="\$#,0.00; (\$#,0.00); \$#,0.00" />
    </Property>
    <Property Name="Sum_of_SalesAmount" Type="Decimal" Precision="19" Scale="4">
        <Documentation>
            <Summary>KPI Description</Summary>
        </Documentation>
        <bi:Measure Caption="Sum of SalesAmount" ReferenceName="Sum of SalesAmount"
FormatString="\$#,0.00; (\$#,0.00); \$#,0.00">
            <bi:Kpi StatusGraphic="Three Circles Colored">
                <bi:KpiGoal>
                    <bi:PropertyRef Name="v_Sum_of_SalesAmount_Goal" />
                </bi:KpiGoal>
                <bi:KpiStatus>
                    <bi:PropertyRef Name="v_Sum_of_SalesAmount_Status" />
                </bi:KpiStatus>
            </bi:Kpi>
        </bi:Measure>
    </Property>
    <NavigationProperty Name="Bike_ProductKey"
Relationship="Sandbox.BikeSales_Bike_Bike_ProductKey" FromRole="BikeSales_ProductKey"
ToRole="Bike_ProductKey">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="CalendarQuarter_CalendarQuarter"
Relationship="Sandbox.BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter"
FromRole="BikeSales_CalendarQuarter" ToRole="CalendarQuarter_CalendarQuarter">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="Country_CountryCode"
Relationship="Sandbox.BikeSales_Country_Country_CountryCode" FromRole="BikeSales_CountryCode"
ToRole="Country_CountryCode">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="Currency_CurrencyKey"
Relationship="Sandbox.BikeSales_Currency_Currency_CurrencyKey"
FromRole="BikeSales_CurrencyKey" ToRole="Currency_CurrencyKey">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="SalesChannel_SalesChannelCode"
Relationship="Sandbox.BikeSales_SalesChannel_SalesChannel_SalesChannelCode"
FromRole="BikeSales_SalesChannelCode" ToRole="SalesChannel_SalesChannelCode">
        <bi:NavigationProperty />
    </NavigationProperty>
    <bi:EntityType />
</EntityType>
<EntityType Name="BikeSubcategory">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="ProductSubcategoryKey" Type="Int64" Nullable="false">
        <bi:Property />
    </Property>
    <Property Name="Subcategory" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>

```

```

    <bi:EntityType />
  </EntityType>
  <EntityType Name="CalendarQuarter">
    <Key>
      <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
      <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="CalendarQuarter2" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
      <bi:Property Caption="CalendarQuarter" ReferenceName="CalendarQuarter" />
    </Property>
    <bi:EntityType />
  </EntityType>
  <EntityType Name="Country">
    <Key>
      <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
      <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="CountryCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
      <bi:Property />
    </Property>
    <Property Name="CountryName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
      <bi:Property />
    </Property>
    <bi:EntityType />
  </EntityType>
  <EntityType Name="Currency">
    <Key>
      <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
      <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="CurrencyKey" Type="Int64" Nullable="false">
      <bi:Property />
    </Property>
    <Property Name="CurrencyAlternateKey" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
      <bi:Property />
    </Property>
    <Property Name="CurrencyName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
      <bi:Property />
    </Property>
    <bi:EntityType />
  </EntityType>
  <EntityType Name="SalesChannel">
    <Key>
      <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
      <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>

```

```

        <Property Name="SalesChannelCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
        <bi:Property />
    </Property>
    <Property Name="SalesChannelName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <bi:EntityType />
</EntityType>
<Association Name="Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey">
    <End Role="Bike_ProductSubcategoryKey" Type="Sandbox.Bike" Multiplicity="*" />
    <End Role="BikeSubcategory_ProductSubcategoryKey" Type="Sandbox.BikeSubcategory"
Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Bike_Bike_ProductKey">
    <End Role="BikeSales_ProductKey" Type="Sandbox.BikeSales" Multiplicity="*" />
    <End Role="Bike_ProductKey" Type="Sandbox.Bike" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter">
    <End Role="BikeSales_CalendarQuarter" Type="Sandbox.BikeSales" Multiplicity="*"
/>
    <End Role="CalendarQuarter_CalendarQuarter" Type="Sandbox.CalendarQuarter"
Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Country_Country_CountryCode">
    <End Role="BikeSales_CountryCode" Type="Sandbox.BikeSales" Multiplicity="*" />
    <End Role="Country_CountryCode" Type="Sandbox.Country" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Currency_Currency_CurrencyKey">
    <End Role="BikeSales_CurrencyKey" Type="Sandbox.BikeSales" Multiplicity="*" />
    <End Role="Currency_CurrencyKey" Type="Sandbox.Currency" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_SalesChannel_SalesChannel_SalesChannelCode">
    <End Role="BikeSales_SalesChannelCode" Type="Sandbox.BikeSales" Multiplicity="*"
/>
    <End Role="SalesChannel_SalesChannelCode" Type="Sandbox.SalesChannel"
Multiplicity="0..1" />
</Association>
</Schema>

```

4 Security

4.1 Security Considerations for Implementers

There are no known security considerations that are not covered in the preceding sections.

4.2 Index of Security Fields

None.

5 Appendix A: Full XML Schema

For ease of implementation, the following are the full **XML schemas** for this protocol.

5.1 CSDLBI Schema 1.0

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="bi"
  targetNamespace="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  elementFormDefault="qualified"
  xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  xmlns:edm="http://schemas.microsoft.com/ado/2008/09/edm"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:import namespace="http://schemas.microsoft.com/ado/2008/09/edm"
    schemaLocation="System.Data.Resources.CSDLSchema_2.xs"/>

  <xs:element name="EntityContainer" type="bi:TEntityContainer"/>
  <xs:element name="EntitySet" type="bi:TEntitySet"/>
  <xs:element name="AssociationSet" type="bi:TAssociationSet"/>
  <xs:element name="EntityType" type="bi:TEntityType"/>
  <xs:element name="Property" type="bi:TProperty"/>
  <xs:element name="NavigationProperty" type="bi:TNavigationProperty"/>
  <xs:element name="Measure" type="bi:TMeasure"/>
  <xs:element name="SourceDescription" type="xs:string" />

  <xs:complexType name="TEntityContainer">
    <xs:sequence>
      <xs:element name="CompareOptions" type="bi:TCompareOptions" />
    </xs:sequence>
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="Culture" type="xs:string" />
    <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
  </xs:complexType>

  <xs:simpleType name="TDirectQueryMode">
    <xs:restriction base="xs:string">
      <xs:enumeration value="InMemory" />
      <xs:enumeration value="InMemoryWithDirectQuery" />
      <xs:enumeration value="DirectQueryWithInMemory" />
      <xs:enumeration value="DirectQuery" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TCompareOptions" >
    <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
  </xs:complexType>

  <xs:complexType name="TEntitySet">
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
    <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
  </xs:complexType>
```

```

<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
</xs:complexType>

<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="Contents" type="bi:TEntityContents" default="Regular"
use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>

<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillOfMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TMemberRefs" >
  <xs:sequence>

```

```

        <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="unbounded"
/>
    </xs:sequence>
</xs:complexType>

<xs:complexType name="TMemberRef">
    <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="TMember" abstract="true">
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule" default="None" />
        <xs:attribute name="Hidden" type="xs:boolean" default="false" />
    <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>

<xs:simpleType name="TContextualNameRule">
    <xs:restriction base="xs:string">
        <xs:enumeration value="None" />
        <xs:enumeration value="Context" />
        <xs:enumeration value="Merge" />
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="TDocumentation">
    <xs:sequence>
        <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
</xs:complexType>

<xs:complexType name="TProperty">
    <xs:complexContent>
        <xs:extension base="bi:TBaseProperty">
            <xs:sequence >
                <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0" maxOccurs="1"/>
            </xs:sequence>
            <xs:attribute name="Contents" type="bi:TContents" use="optional" default="Regular"/>
            <xs:attribute name="DefaultAggregateFunction" type="bi:TDefaultAggregateFunction"
default="Default" />
            <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
default="GroupOnValue"/>
            <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TContents">
    <xs:restriction base="xs:string" />
</xs:simpleType>

<xs:simpleType name="TDefaultAggregateFunction" >
    <xs:restriction base="xs:string">
        <xs:enumeration value="Default" />
        <xs:enumeration value="None" />
        <xs:enumeration value="Sum" />
        <xs:enumeration value="Count" />
        <xs:enumeration value="Average" />
        <xs:enumeration value="Min" />
        <xs:enumeration value="Max" />
    </xs:restriction>
</xs:simpleType>

```

```

        <xs:enumeration value="DistinctCount" />
    </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TGroupingBehavior" >
    <xs:restriction base="xs:string" >
        <xs:enumeration value="GroupOnValue" />
        <xs:enumeration value="GroupOnEntityKey" />
    </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TStability">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Stable" />
        <xs:enumeration value="RowNumber" />
        <xs:enumeration value="Volatile" />
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="TBaseProperty" abstract="true">
    <xs:complexContent>
        <xs:extension base="bi:TMember">
            <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
            <xs:attribute name="FormatString" type="xs:string" use="optional"/>
            <xs:attribute name="Units" type="xs:string" use="optional" />
            <xs:attribute name="SortDirection" type="bi:TSortDirection" default="Default"/>
            <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TAlignment">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Default" />
        <xs:enumeration value="Left" />
        <xs:enumeration value="Right" />
        <xs:enumeration value="Center" />
    </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TSortDirection">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Default" />
        <xs:enumeration value="Ascending" />
        <xs:enumeration value="Descending" />
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="TPropertyRefs" >
    <xs:sequence>
        <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
    </xs:sequence>
</xs:complexType>

<xs:complexType name="TPropertyRef">
    <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

```

```

<xs:complexType name="TMeasure">
  <xs:complexContent>
    <xs:extension base="bi:TProperty">
      <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TNavigationProperty">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

</xs:schema>

```

5.2 CSDLBI Schema 1.1

```

<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="bi"
  targetNamespace="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  elementFormDefault="qualified"
  xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  xmlns:edm="http://schemas.microsoft.com/ado/2008/09/edm"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:import namespace="http://schemas.microsoft.com/ado/2008/09/edm"
    schemaLocation="System.Data.Resources.CSDLSchema_2.xs"/>

  <xs:element name="EntityContainer" type="bi:TEntityContainer"/>
  <xs:element name="EntitySet" type="bi:TEntitySet"/>
  <xs:element name="AssociationSet" type="bi:TAssociationSet"/>
  <xs:element name="EntityType" type="bi:TEntityType"/>
  <xs:element name="Property" type="bi:TProperty"/>
  <xs:element name="NavigationProperty" type="bi:TNavigationProperty"/>
  <xs:element name="Measure" type="bi:TMeasure"/>
  <xs:element name="SourceDescription" type="xs:string" />

  <xs:complexType name="TEntityContainer">
    <xs:sequence>
      <xs:element name="CompareOptions" type="bi:TCompareOptions" />
    </xs:sequence>
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="Culture" type="xs:string" />
    <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
  </xs:complexType>

  <xs:simpleType name="TDirectQueryMode">
    <xs:restriction base="xs:string">
      <xs:enumeration value="InMemory" />
      <xs:enumeration value="InMemoryWithDirectQuery" />
      <xs:enumeration value="DirectQueryWithInMemory" />
      <xs:enumeration value="DirectQuery" />
    </xs:restriction>
  </xs:simpleType>

```

```

<xs:complexType name="TCompareOptions" >
  <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
</xs:complexType>

<xs:complexType name="TEntitySet">
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
</xs:complexType>

<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
</xs:complexType>

<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="Hierarchy" type="bi:THierarchy" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="Contents" type="bi:TEntityContents" default="Regular" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>

<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
  </xs:restriction>
</xs:simpleType>

```

```

    <xs:enumeration value="BillofMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TMemberRefs" >
  <xs:sequence>
    <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="unbounded"
  />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TMemberRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="THierarchy">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0"
maxOccurs="1" />
        <xs:element name="Level" type="bi:TLevel" minOccurs="1" maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TMember" abstract="true">
  <xs:attribute name="Name" type="xs:string" use="required" />
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule" default="None" />
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
  <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>

<xs:simpleType name="TContextualNameRule">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None" />
    <xs:enumeration value="Context" />
    <xs:enumeration value="Merge" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TDocumentation">
  <xs:sequence>
    <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="TLevel">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Source" minOccurs="0" maxOccurs="1" >
          <xs:complexType >
            <xs:sequence>
              <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
                maxOccurs="1" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TProperty">
  <xs:complexContent>
    <xs:extension base="bi:TBaseProperty">
      <xs:sequence >
        <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0" maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="Contents" type="bi:TContents" use="optional" default="Regular"/>
      <xs:attribute name="DefaultAggregateFunction" type="bi:TDefaultAggregateFunction"
default="Default" />
      <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
default="GroupOnValue"/>
      <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TContents">
  <xs:restriction base="xs:string" />
</xs:simpleType>

<xs:simpleType name="TDefaultAggregateFunction" >
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="None" />
    <xs:enumeration value="Sum" />
    <xs:enumeration value="Count" />
    <xs:enumeration value="Average" />
    <xs:enumeration value="Min" />
    <xs:enumeration value="Max" />
    <xs:enumeration value="DistinctCount" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TGroupingBehavior" >
  <xs:restriction base="xs:string" >
    <xs:enumeration value="GroupOnValue" />
    <xs:enumeration value="GroupOnEntityKey" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TStability">
  <xs:restriction base="xs:string">

```

```

    <xs:enumeration value="Stable" />
    <xs:enumeration value="RowNumber" />
    <xs:enumeration value="Volatile" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TBaseProperty" abstract="true">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
      <xs:attribute name="FormatString" type="xs:string" use="optional"/>
      <xs:attribute name="Units" type="xs:string" use="optional" />
      <xs:attribute name="SortDirection" type="bi:TSortDirection" default="Default"/>
      <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TAlignment">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Left" />
    <xs:enumeration value="Right" />
    <xs:enumeration value="Center" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TSortDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Ascending" />
    <xs:enumeration value="Descending" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TPropertyRefs" >
  <xs:sequence>
    <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TPropertyRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="TMeasure">
  <xs:complexContent>
    <xs:extension base="bi:TProperty">
      <xs:sequence>
        <xs:element name="Kpi" type="bi:TKpi" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TKpi">
  <xs:sequence >

```

```

    <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0" maxOccurs="1"
  />
  <xs:element name="KpiGoal" minOccurs="1" maxOccurs="1" >
    <xs:complexType >
      <xs:sequence>
        <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1" maxOccurs="1"
  />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="KpiStatus" minOccurs="1" maxOccurs="1" >
    <xs:complexType >
      <xs:sequence>
        <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1" maxOccurs="1"
  />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:sequence>
<xs:attribute name="StatusGraphic" type="xs:string" use="required"/>
</xs:complexType>

<xs:complexType name="TNavigationProperty">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

</xs:schema>

```

6 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft SQL Server 2012 Service Pack 1 (SP1)

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

[<1> Section 2.1.9:](#) The **Caption** attribute is not included in SQL Server 2012 SP1.

[<2> Section 2.1.17:](#) The **Documentation** element is not serialized in SQL Server 2012 SP1.

7 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

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